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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Martha Ann Finnegan  
Chief Intellectual Property Counsel, Cabot Corp.  
157 Concord Road  
Billerica Technical Center  
Billerica, MA 01821

EXAMINER

WYROZEBSKI LEE, KATARZYNA I

ART UNIT

PAPER NUMBER

1714

9

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/730,463

Applicant(s)

SIEVERS ET AL.

Examiner

Katarzyna W. Lee

Art Unit

1714

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 August 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☒ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) g. 6) ☐ Other:

*Use Claims*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claims 10, 11, 14, 17-19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 10, 11, 14, 17-19 provide ~~for~~ the use of interpenetrating network. Since the claims do not set forth any steps involved in the method/process, it is unclear what method/process applicant intends to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Additionally 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Thus, claims 10, 11, 14, 17-19 are also rejected under 35 U.S.C 101 because the claimed recitation of use, without setting forth any steps involved in the process, results in an improper definition of process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See, for example, *Ex Parte Dunki*, 153 USPQ 678 (Bd.App 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1996).

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

4. Claims 8, 10, 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to the claims 8, 10 and 11, the applicant claims materials, which are obtainable by the process of claims 1, 7 and 6 respectively. Use of term "obtainable" renders claim indefinite, since this term merely indicates, that the material can be obtained by such process, and not that it actually is.

***Claim Objections***

5. Claim 3 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

With respect to the above objection, the examiner understands the terminology of laminar silicate as that, which encompasses clays, zeolites, micas and the like, having layered structure.

If examiner's interpretation is correct, then claim 3 fails to further narrow the recitation of claim

1. Specifically, the laminar silicates include metal oxides other than silicon oxide. Additional oxides include aluminum oxide, magnesium oxide and the like. Since claim 1 only discloses the silicon oxide compounds that result making of silica gel. Unlike sodium silicate and silicic acid, laminar silicates, formation of SiO<sub>2</sub> would involve steps other than hydrolysis, cation exchange or condensation. The applicant is requested to clarify the recitation of laminar silicates.

6. Claim 10 objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim can not make a reference to two sets of claims of different features. See MPEP § 608.01(n). However, for more prompt prosecution of the case, the claim 10 has been treated as that dependent on process claim 7.

### *Specification*

7. The disclosure is objected to because of the following informalities: The following parts of the specification introduce ambiguities and indefiniteness to the utilized definitions of the and therefore should be removed.

Page 1, line 17: [*sic; fluorosilicone? - - Tr. Ed.*]

Page 7, line 7-9: [*sic; weight? - - Tr. Ed.*]; [*sic; vol.%? - - Tr. Ed.*]

Page 11, line 4: [*sic; system? - - Tr. Ed.*]

Page 14, line 7: [*sic; nm? - - Tr. Ed.*]

Page 19, line 5: [*sic; diameter? - - Tr. Ed.*]

Appropriate correction is required.

8. An abstract on a separate sheet is required.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1, 3, 7, 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Harmer (US 5,824,622).

Example 2 of the prior art of Harmer discloses aqueous solution of fluorinated resin mixed with NaOH. In a separate beaker an aqueous solution of TMOS (tetramethoxysilane) was mixed with HCl stirred and allowed to stand for 10 minutes. This process will inherently form SiO<sub>2</sub> compound. It is also stated in the example that the aqueous solution containing silicon compound was added and mixed with the aqueous polymer solution, mixed well and left to stand for 10 minutes to allow formation of gel. The presence of the base in polymer solution will also inherently change the pH of otherwise acidic silicon solution. At the same time, if acidic silicon oxide solution was added, the pH of otherwise basic polymer solution would also be inherently

changed. Gel was placed in an oven at elevated temperatures for times adequate to dry the gel. Nitrogen gas was utilized during the drying process. The resulting composition was highly porous. Furthermore, since aerogel is prepared by drying a gel, therefore it further meets the limitations of claim 7 of the present invention.

According to the further examples in the prior art of Harmer, other source of silicon oxide besides TMOS is sodium silicate or mixtures thereof. The resulting silica gel pores have diameter of approximately 2.1 nm (Ex. 18) to 20 nm (Ex 16). Since the organic polymer and silica gel form a network in which the polymer is imbedded into silica pores, therefore the distance between the inorganic and organic components of the is inherently less than 100 nm.

In the light of the above disclosure, the prior art of Harmer anticipates the claims rejected above.

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 5, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harmer (US 5,824,622) in view of Jansen (US 5,795,556).

The discussion of the disclosure of the prior art of Harmer from paragraph 10 of this office action is incorporated here by reference.

The differences between the present invention and the disclosure of the prior art of Harmer is the step of silylation, removing aqueous solvent with addition of organic solvent and the density of the gel and thermal insulation properties.



With respect to the above difference, the prior art of Jansen discloses another well known in the art process of making silica xerogel, which includes the following steps:

- a) Providing aqueous solution of sodium silicate (Ex. 1 discloses 8%) at a pH of  $\leq 2.2$ ,
- b) Polycondensing silica by adding base to give  $\text{SiO}_2$ ,
- c) Washing the electrolytes of with water,
- d) Washing the gel with organic solvent,
- e) Reacting obtained gel with silylation agent
- f) Drying silylated gel.

The density of the gels obtained utilizing process disclosed above is less than  $0.6 \text{ g/cm}^3$  and result in product, containing excellent heat insulating properties

Silica gels such as aerogels and xerogels can be modified by reacting it with silylating agent. Silylating agents give such gels more stability when dried under subcritical conditions. In addition, silylating agents impart hydrophobic character to the gel, since the substituents on the silicon compound are alkyls, cyclohexyl or phenyl.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize otherwise known process of Jensen to form a gel of Harmer and thereby obtain the claimed invention. Utilizing the process of Jensen would still result in gelation of silica and polymer wherein due to silylation the silica gel would have been more stable.

15. Claims 4, 6, 11-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harmer (US 5,824,622) in view of Jansen (US 5,795,556) as applied to claims 1, 3, 5, 7-10 above, and further in view of Geiss (US 5,948,314).

The discussion of the disclosure of the prior art of Harmer and Jensen from paragraphs 10 and 14 of this office action are incorporated here by reference.

The difference between the present invention and the disclosure of the prior art of Harmer and Jansen is showing that the silica based thermal insulation products can be molded or coated before drying as well as the additives, which can be utilized in such compositions. In addition, the difference is teaching of making ceramic articles and composite material, which can be produced in form of granulates.

With respect to the above difference, the prior art of Geiss discloses another well known in the art method of making gels from silicon containing compounds. Preferred metal oxides utilized are silicon oxide to form silica aerogel or silica xerogel having density of less than 0.6 g/cm<sup>3</sup>.

Silylated silica gel of the prior art of Geiss is utilized in composition with polymeric component such as styrene-acrylate copolymer in an aqueous solution and the final composition has excellent thermal insulating properties.

The additives of the prior art of Geiss include various fibers such as polyester fibers, glass fibers or mineral binders. Mineral binders include compounds such as phyllosilicates, which are also known as ceramic compounds, which in turn can be very easily calcined. The insulating materials such as that in the disclosure of Geiss are also suitable as binders in form of granules or particles.

In the process of article making, the prior art of Geiss discloses, that the suspensions, because of their flowability can be poured into mold or coated onto a surface so that after drying they can take required shape. Layers formed utilizing the above composition can find use in ultrasound transmitters, wherein ultrasound is well known medical field.

Silica gels, which have low thermal conductivity have wide field of use, because their combination with polymers and fillers can impart many different properties. The compositions can be made to either absorb sound or heat or insulate from it.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art to utilize various types of fillers in the composition of Harmer in view of Jensen and still obtain claimed invention. Fillers such as those utilized in the prior art of Geiss would add properties necessary for composite to efficiently perform as thermal insulator.

16. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harmer (US 5,824,622) in view of Pekala (US 5,086,085).

The discussion of the disclosure of the prior art of Harmer from paragraph 10 of this office action is incorporated here by reference.

The difference between the present invention and the prior art of Harmer is teaching of other polymers capable of forming aerogels, which could be effectively combined with silica gel.

With respect to the above disclosure, the prior art of Pekala discloses a composition for aerogel comprising melamine-formaldehyde resin.

According to the process of the prior art of Pekala, the melamine-formaldehyde gel is first polymerized in aqueous conditions. The gel is formed in presence of base, preferably

NaOH also in aqueous solution. Basic solution is then neutralized with acid to adjust the pH and allowed to gel. The gel is then dried to create aerogel.

The process of the gel formation for melamine-formaldehyde polymer is basically the same as that of paragraph 10, because polar polymers are capable of exchange. In addition obtained gel is very close in both porosity and structure to that of silica.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize melamine-formaldehyde polymer instead of fluorinated polymer and thereby obtain the claimed invention. Use of melamine-formaldehyde gels would also result in formation of interpenetrating networks between the silica and the polymer.

17. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harmer (US 5,824,622) in view of Mager (US 6,271,292 B1).

The discussion of the disclosure of the prior art of Harmer from paragraph 4 of this office action is incorporated here by reference.

The difference between the present invention and the prior art of Harmer is teaching of other polymers capable of forming aerogels, which could be effectively combined with silica gel.

With respect to the above disclosure, the prior art of Mager discloses a composition comprising organic-inorganic hybrid materials capable of forming interpenetrating network.

The organic polymers, which can be utilized in the composition, include polyacrylates, polymethacrylates, polyvinyl esters, polyesters and polyols.

The metal oxides as shown in the examples include silanes, which have been subjected to silylation and which create silica sol.

Obtained silica sol, creates interpenetrating network with the polymers of the prior art of Mager. The resulting material exhibit good wear resistance to, for example, solvents.

In the light of the above disclosure, it would have been obvious to one having ordinary skill in the art at the time of the instant invention to utilize the polymers of the prior art of Mager with the silica gels of the Harmer and thereby obtain the claimed invention. Utilizing the polymers of the prior art of Mager would also result in composition where the polymer and silica gel are interpenetrated together.

### ***Priority***

It is noted that the applicant has not provided certified copy of the priority document and certified translation, if such document is not in English. The priority therefore cannot be granted at this point.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katarzyna W. Lee whose telephone number is (703) 306-5875. The examiner can normally be reached on Mon-Thurs 6:30 AM-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (703) 306-2777. The fax phone numbers for the

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organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

KIWL  
February 1, 2002

**VASU JAGANNATHAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700**